Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1. (Currently Amended) An apparatus for the generation of high-energy terahertz radiation comprising:

a source effective to produce optical radiation; and

a semiconductor substrate having a refractive index, n, and an integral grating structure formed on a surface of the semiconductor substrate in which a photo-generated dipole is generated upon interaction with the optical radiation, the photo-generated dipole oriented by the grating structure to radiate terahertz radiation having power at least about n^2 times higher than the power of the terahertz radiation radiated by a photo-generated dipole which is not so oriented.

2. (Original) The apparatus of claim 1 wherein the source is a laser that produces pulsed optical radiation having a femtosecond duration.

3. (Original) The apparatus of claim 2 wherein the laser produces pulsed optical radiation having a wavelength of about 800 nm.

4. (Original) The apparatus of claim 3 wherein the laser is a titanium:sapphire laser.

5. (Original) The apparatus of claim 1 wherein the photo-generated dipole is oriented substantially perpendicular to the propagating direction of the terahertz radiation.

6. (Currently Amended) The apparatus of claim 1 wherein the ~~semiconductor substrate has a~~ grating ~~with~~ structure has an apex angle of about ninety degrees.

7. (Currently Amended) The apparatus of claim ~~6~~ 1 wherein the size of the grating structure is up to about 5 μm.

8. (Currently Amended) The apparatus of claim ~~6~~ 1 wherein the semiconductor substrate is GaAs.

9. (Currently Amended) The apparatus of claim ~~6~~ 1 wherein the optical radiation of the laser is incident substantially perpendicular to the grating of the semiconductor substrate.

10. (Currently Amended) An apparatus for the generation of high-energy terahertz radiation comprising:

a source effective to produce optical radiation; and

a semiconductor substrate having a refractive index, n, and a photo-generated dipole generated upon interaction with the optical radiation, the photo-generated dipole oriented to radiate terahertz radiation having power at least about n^2 times higher than the power of the terahertz radiation radiated by a photo-generated dipole which is not so oriented; and

~~The apparatus of claim 1 further comprising~~ a structure of a polytetrafluoroethylene base with an InAs film forming a grating on the surface of the semiconductor substrate.

11. (Original) The apparatus of claim 10 wherein the grating has an apex angle of about ninety degrees.

12. (Original) The apparatus of claim 10 wherein the InAs film has a thickness greater than the absorbance length of the optical radiation.

13. (Original) The apparatus of claim 10 wherein the optical radiation is incident substantially perpendicular to the grating of the semiconductor substrate.

14. (Currently Amended) The apparatus of claim 1 wherein the ~~semiconductor substrate has~~grating structure includes a grating formed by a series of structures each having the configuration of a ~~right~~ triangle.

15. (Original) The apparatus of claim 14 wherein the optical radiation is incident on the surface of the semiconductor substrate at the Brewster's angle to each individual structure of the grating.

16. (Currently Amended) A method for the generation of high-energy terahertz radiation comprising:

providing a semiconductor substrate having a refractive index, n, and ~~a modified surface~~ an integral grating structure;

applying an electric field to the semiconductor substrate; and

directing optical radiation to the semiconductor substrate, thereby creating a photo-generated dipole emitting terahertz radiation,

the photo-generated dipole oriented by the grating structure ~~modified surface~~ of the semiconductor substrate to emit terahertz radiation having power at least about n^2 times higher than the power of the terahertz radiation radiated by a photo-generated dipole which is not so oriented.

17. (Original) The method of claim 16 wherein the photo-generated dipole is oriented substantially perpendicular to the propagating direction of the terahertz radiation.

18. (Currently Amended) The method of claim 16 wherein the semiconductor substrate is GaAs, the ~~surface of the semiconductor substrate is modified by a~~ grating ~~with~~ structure has an apex angle of about ninety degrees, and the optical radiation is incident substantially perpendicular to the grating structure of the semiconductor substrate.

19. (Currently Amended) The method of claim 16 wherein the grating structure includes ~~surface of the semiconductor substrate is modified by a~~ polytetrafluoroethylene base with an InAs film forming a grating on the surface of the semiconductor substrate, the InAs film has a thickness greater than the absorbance length of the optical radiation, and the optical radiation is incident substantially perpendicular to the grating of the semiconductor substrate.

20. (Currently Amended) The method of claim 16 wherein the grating structure includes~~surface of the semiconductor substrate is modified by~~ a grating formed by a series of structures each having the configuration of a right triangle and the optical radiation is incident on the surface of the semiconductor substrate at the Brewster's angle to each individual structure of the grating.